CORD MEMBER SAFETY CONNECTOR FOR WINDOW BLIND

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to a window blind and, more specifically, to a cord member safety connector used in a window blind, which will be self-unconnected from the window blind when the cord member receives an exceeding load.

2. Description of the Related Art

A variety of window coverings including Venetian blinds, roller blinds, etc. are known. These window coverings commonly comprise a headrail, a bottom rail, a blind body coupled between the headrail and the bottom rail, a lifting mechanism controlled to lift the bottom rail to the desired elevation to further change the shading status of the window covering. The lifting mechanism comprises a plurality of pull cords for operation by the user to adjust the elevation or shading status of the window covering.

In the aforesaid window coverings, the pull cords are exposed to the outside and accessible to children. An accident may happen when a child playing with the cord members for fun. FIG. 1 shows a conventional roller blind, which comprises a headrail **1**, a bottom rail **2**, a blind body **3** coupled between the headrail **1** and the bottom rail **2**, and a lifting mechanism **4** adapted to control the lifting and positioning of the bottom rail **2** to change the shading status of the blind body **3**. The lifting mechanism **4** comprises two lift cord sets **5**, two lift cord brackets **6** at the back side of the headrail **2**, and a lift lock **7**. The lift cord sets **5** each have a respective rear cord section **5a** respectively fastened to the lift cord brackets **6** and then extended downwards over the

bottom side of the bottom rail **2**, a respective front section **5b** extended upwards to the inside of the headrail **1** and then inserted through the lift lock **7**, and a respective operation section **5c** extended out of the headrail **1** for operation by the user. The rear section **5a** and front section **5b** of each cord member of the lift cord set **5** form an enclosed loop **5d**. This enclosed loop **5d** may be tangled and hung on the retaining portion of the child who plays with the lift cord sets **5** for fun.

Therefore, it is desirable to provide a cord member safety connector that eliminates the aforesaid problem.

SUMMARY OF THE INVENTION

It is the main object of the present invention to provide a cord member safety connector, which automatically disconnects the cord member from the window blind when the cord member received a stretching force surpassed a predetermined level.

To achieve this object of the present invention, the connector for connecting a cord member of a window blind includes a supporting member and a coupling member detachably coupled to the supporting member. The supporting member has a receiving space and an escape opening that is communicated with the receiving space and has a diameter smaller than that of the receiving space. The coupling member has a retaining portion received in the receiving space and stopped above the escape opening, and a cord member tie portion for connection of the cord member. When the cord member is pulled by an external force over a predetermined level, the retaining portion is allowed to pass through the escape opening such that the coupling member is detached from the supporting member.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a window blind according to the prior art.

FIG. 2 is an exploded view of a cord member safety connector according to a first preferred embodiment of the present invention.

FIG. 3 is a schematic sectional view of the cord member safety connector according to the first preferred embodiment of the present invention.

FIG. 4 is a perspective view showing the cord member safety connector of the first preferred embodiment of the present invention installed in a headrail of a window blind.

FIG. 5 is an exploded view of a cord member safety connector according to a second preferred embodiment of the present invention.

FIG. 6 is a perspective assembly view of the cord member safety connector according to the second preferred embodiment of the present invention.

FIG. 7 is an exploded view of a cord member safety connector according to a third preferred embodiment of the present invention.

FIG. 8 is a sectional assembly view of the cord member safety connector according to the third preferred embodiment of the present invention.

FIG. 9 is a perspective view showing the cord member safety connector of the third preferred embodiment of the present invention installed in the headrail of a window blind.

DETAILED DESCRIPTION OF THE INVENTION

Referring to FIG. 2, a cord member safety connector **10** in accordance with the first preferred embodiment of the present invention is shown comprised of a

supporting member **20** and a coupling member **30**. The supporting member **20** is molded from plastics or elastic material, comprising a solid base **21** and a flat mounting portion, i.e. mounting flange **22,** perpendicularly extended from the periphery of the top side of the solid base **21**. The solid base **21** has a coupling portion **23** having a receiving space, e.g. a cylindrical through hole **24**, which extends through the top and bottom sides of the solid base **21**. The cylindrical through hole **24** has a reduced bottom end **25** of relatively smaller diameter, forming an escape opening of the coupling portion. The flat mounting flange **22** has an elongated slot **26**. The coupling member **30** is a cylindrical rod member having a body portion **32**, a radially compressible retaining portion, namely, the expanded top split head **31** at one end of the body portion **32** (the top split head **31** is a round head having a plurality of radial splits), and a cord member tie portion formed of a tie hole **33** at the other end of the body portion **32** for the connection of a cord member. The body portion **32** has a diameter slightly smaller than the reduced bottom end **25** of the cylindrical through hole **24**. The top split head **31** is radially compressible, having a diameter slightly smaller than the cylindrical through hole **24** of the coupling portion **23** but slightly greater than the reduced bottom end **25** of the cylindrical through hole **23**.

The connection between the supporting member **20** and the coupling member **30** is outlined hereinafter with reference to FIG. 3. The coupling member **30** is downwardly inserted into the coupling portion **23** of the supporting member **20** from the top side, keeping the expanded top split head **31** of the coupling member **30** stopped at the reduced bottom end **25** of the cylindrical through hole **24** of the coupling portion **23** of the supporting member **20**. At this time, the coupling member **30** can be rotated in the coupling portion **23** of the supporting member **20**. When the tie hole **33** of the coupling member **30** is receiving an external force that pulls the coupling

member **30** outwards from the coupling portion **23** of the supporting member **20**, the expanded top split head **31** is forced against the peripheral wall of the reduced bottom end **25** of the cylindrical through hole **24** of the coupling portion **23** of the supporting member **20** and radially inwardly compressed to reduce its outer diameter and the reduced bottom end **25** is pressed to slightly expend its diameter. If the external force is continuously increased, the expanded top split head **31** will be compressed to such an extent that the diameter of the compressed top split head **31** becomes smaller than the diameter of the reduced bottom end **25** of the cylindrical through hole **24**, for enabling the coupling member **30** to be disconnected from the supporting member **20**.

Referring to FIG. 4, the elongated slot **26** of the flat mounting flange **22** of the supporting member **20** is fastened to the headrail **A** of a window blind (not shown) with a hanger **B**, and a cord member **C** is fastened to the tie hole **33** at the bottom end of the body portion **32** of the coupling member **30** after insertion of the coupling member **30** into the cylindrical through hole **24** of the coupling portion **23** of the supporting member **20**. On design, the friction force **F** between the top split head **31** of the coupling member **30** and the reduced bottom end **25** of the cylindrical through hole **24** of the coupling portion **23** of the supporting member **20** must surpass the load of window blind **W** so that the coupling member **30** is normally maintained connected to the supporting member **20**. When the coupling member **30** received an external force **P** over a predetermined value (for example, a stretching force from a child), the top split head **31** of the coupling member **30** is forced to pass through the reduced bottom end **25** of the cylindrical through hole **24** of the supporting member **20**, and therefore the coupling member **30** and the cord member **C** are disconnected from the headrail **A** of the window blind; i.e., the friction force **F** is designed as the following formula.

load of window blind **W** < friction force **F**< external force **P**

In short, the main feature of the present invention is to set a safety range for the load at the cord member of the window blind so that the cord member is automatically disconnected from the window blind when received a pressure surpassed the set safety range, preventing a hanging accident of the cord member on a child playing the cord member.

FIG. 5 shows a cord member safety connector **40** according to the second preferred embodiment of the present invention, which is comprised of a supporting member **50** and a coupling member **60**. The supporting member **50** has a downwardly extended flat base **51**, and a coupling portion **53** at the base **51** for receiving the coupling member **60**. The coupling portion **53** comprises a receiving space, i.e. a circular through hole **54,** cut through the front and back sides of the base **51**, and an escape opening, i.e. a curved crevice **55** extended from the circular through hole **54** to the periphery of the base **51**. The coupling member **60** is a cylindrical member having a round head **61a** at one end, a tie hole **63** at the other end, a collar **61b** on the middle around the periphery, and a retaining portion **62** between the round head **61a** and the collar **61b**. The diameters of the round head **61a** and the collar **61b** are slightly greater than the diameter of the circular through hole **54**. The diameter of the retaining portion **62** is smaller than the diameter of the circular through hole **54** but greater than the width of the crevice **55**.

The connection between the supporting member **50** and the coupling member **60** is outlined hereinafter with reference to FIG. 6. The coupling member **60** is inserted into the circular through hole **54** of the coupling portion **53** of the supporting member **50** by force, keeping the retaining portion **62** suspended in the circular through hole **54** and the round head **61a** and collar **61b** respectively stopped at the back and front sides of the base **51**. When the cord member **63** at the tie hole **63** of the coupling member **60**

excessively stretched by an external force, the crevice **55** is forced to expand, allowing the retaining portion **62** to pass through the crevice **55** to the outside of the coupling portion **53**, and therefore the coupling member **60** is disconnected from the supporting member **50**.

FIG. 7 shows a cord member safety connector **70** according to the third embodiment of the present invention, which is comprised of a supporting member **80** and a coupling member **90**. The supporting member **80** comprises a hollow base **81**, a mounting portion **82** at the top side of the hollow base **81**, a wire hole **86** in the mounting portion **82** for connection to the window blind, and a coupling portion **83** in the hollow base **81** below the wire hole **86** for receiving the coupling member **90**. The coupling portion **83** comprises a receiving space, i.e. a chamber **84**, and an escape opening, i.e. a through hole **85** downwardly extended from the chamber **84** to the bottom side of the hollow base **81**. The diameter of the through hole **85** is smaller than the diameter of the chamber **84**. The coupling member **90** is a substantially U-shaped springy member having a tie hole **91** at the bottom side, two upwardly extended parallel springy arms **92**, and two rounded retaining portions **93** respectively formed integral with the distal ends of the springy arms **92**.

The installation of the third embodiment of the present invention is outlined hereinafter with reference to FIGS 8 and 9. After connection of the wire hole **86** to the hanger **B** at the headrail **A** of the window blind and connection of a cord member **C** to the tie hole **91** of the coupling member **90**, the springy arms **92** of the coupling member **90** are squeezed inwards to force the retaining portions **93** toward each other for enabling the coupling member **90** to be inserted through the through hole **85** of the coupling portion **83** into the inside of the chamber **84**. When released the hand from the coupling member **90** after its insertion through the through hole **85** into the

chamber **84**, the springy arms **92** automatically return to their former shape due to the effect of their springy material property, and therefore the separated retaining portions **93** are stopped inside the chamber **84** and prohibited from passing through the through hole **85**. When the cord member **C** received an excessively high stretching force, the springy arms **92** are forced toward each other by the peripheral wall of the through hole **85** to force the retaining portions **93** against each other, for enabling the retaining portions **93** to pass through the through hole **85**, and therefore the cord member **C** with the coupling member **90** are disconnected from the supporting member **80** at the window blind.

The aforesaid three embodiments are commonly designed for use in roller blinds. Actually, the invention can be designed to connect the load-carrying cord member or exposed cord member of any of a variety of window blinds. When the load surpassed the set safety range, the cord member is disconnected in time, preventing the occurrence of an accident.

Although particular embodiments of the invention have been described in detail for purposes of illustration, various modifications and enhancements may be made without departing from the spirit and scope of the invention. Accordingly, the invention is not to be limited except as by the appended claims.